This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

Usage guidelines

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

+ *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.

+ *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.

+ *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.

+ *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

About Google Book Search

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at `http://books.google.com/`

The printed slips attached to the margins of the pages contain criticisms made upon the the text by the Lautensach Committee and the reply to the same, in order that the reader may see how captious and groundless most of those criticisms were.

The printed slips attached to the margins of the pages contain criticisms made upon the the text by the Lautenbach Committee and the reply to the same, in order that the reader may see how captious and groundless most of those criticisms were.

NEW CENTURY SERIES
OF ANATOMY PHYSIOLOGY AND HYGIENE

1. ANATOMY PHYSIOLOGY AND HYGIENE

   For High Schools

   By **HENRY F. HEWES**, A.B., M.D. (Harvard), Instructor in Physiological and Clinical Chemistry, Harvard University Medical School, Boston.

2. ELEMENTARY ANATOMY PHYSIOLOGY AND HYGIENE

   For Higher Grammar Grades

   By **WINFIELD S. HALL**, PH.D., M.D. (Leipsic), Professor of Physiology, Northwestern University Medical School, Chicago.

3. INTERMEDIATE PHYSIOLOGY AND HYGIENE

   For Fifth and Sixth Year Pupils, or Corresponding Classes in Ungraded Schools

   By **WINFIELD S. HALL**, PH.D., M.D. (Leipsic), Professor of Physiology, Northwestern University Medical School, Chicago, and

   JEANNETTE WINTER HALL, Special Teacher of Physiology, Berwyn, Illinois.

4. THE NEW CENTURY PRIMER OF HYGIENE

   First Book for Pupils' Use

   By **JEANNETTE WINTER HALL**, Special Teacher of Physiology, Berwyn, Illinois.

5. ORAL LESSON BOOK IN HYGIENE

   For Primary Teachers

   By **HENRIETTA AMELIA MIRICK**, A.B. (Wellesley), Assistant Editor School Physiology Journal, Boston.

NEW CENTURY SERIES
OF ANATOMY PHYSIOLOGY AND HYGIENE

THE NEW CENTURY PRIMER OF HYGIENE

FOR

FOURTH YEAR PUPILS

BY

JEANNETTE WINTER HALL
Special Teacher of Physiology, Berwyn, Ill.

NEW YORK ·:· CINCINNATI ·:· CHICAGO
AMERICAN BOOK COMPANY

4. A. 460.

INDORSEMENT

We, the undersigned, have carefully examined the school text-book entitled

THE NEW CENTURY PRIMER OF HYGIENE,

by Jeannette Winter Hall, with reference to the following points:

1. Fullness and accuracy of subject-matter relating to the nature and effects of alcoholic drinks and other narcotics upon the human system.

2. Amount of matter on general hygiene.

3. Presentation of matter with regard to its adaptability to the class of pupils for which it is designed.

We are satisfied that on all of these points, as well as in the regular anatomy and physiology, the treatment is as complete as is required for a book of this grade, and fully in harmony with the results of the latest investigations. We therefore heartily indorse the book for Fourth Year Pupils.

A. H. Plumb, D.D.
Rev. Joseph Cook, LL.D.
Daniel Dorchester, D.D.
William A. Mowry, Ph.D.
L. D. Mason, M.D.
T. D. Crothers, M.D.
Chas. H. Shepard, M.D.
George W. Webster, M.D.
Text-book Committee of the Advisory Board.

Mrs. Mary H. Hunt,
World's and National Superintendent of Scientific Temperance Instruction of the Woman's Christian Temperance Union.

Copyright, 1901, by
AMERICAN BOOK COMPANY.

Entered at Stationers' Hall, London.

PRIM. OF HYGIENE.
W. P. 6

PREFACE

PHYSIOLOGY and hygiene was formerly considered a study adapted only to pupils of advanced grades. Wiser thought has led to the conclusion that if we are to have generations of well-developed men and women, education as to the laws of health must begin with those early school years in which the habits of life are forming.

Primary pupils look to the teacher as the chief source of information. In attempting to use a book the difficulties of the printed page absorb so much of their attention that the thought conveyed is slowly grasped. Pupils of the fourth year, on the other hand, have already acquired the ability to gain information from many sources, one of which is the text-book.

As it is obvious, therefore, that the use of text-books should begin with the fourth school year, an attempt has been made in this little book to present the subject of physiology in language fitted to children of that grade without sacrificing the dignity of the subject; to introduce some of the facts of comparative anatomy which will lead them to observe animals and recognize them as fellow creatures; to suggest easily obtainable material which will serve to illustrate without being repulsive.

The author desires to acknowledge her indebtedness to Professor Winfield S. Hall of Chicago, Department of Physiology, Northwestern University Medical School, for supervising the text from a physiological standpoint, and to Miss Lucy Simonson, a teacher of the fourth grade in the schools of Berwyn, Illinois, for suggestions regarding its adaptation to the fourth grade.

JEANNETTE WINTER HALL.

CHICAGO, ILL.

CONTENTS

LESSON PAGE

I. The Framework of Animals 9

II. The Framework of Man 14

III. The Skeleton of the Head and Trunk . . 17

IV. How the Bones are joined together: Joints. 20

V. The Care of the Bones 24

VI. What the Body Needs 31

VII. Why do we Eat? 36

VIII. What shall we Eat? 41

IX. What shall we Drink? 45

X. Shall we drink the Juice of Fruits? . . 50

XI. Overeating 56

XII. How the Food is prepared in the Mouth . 60

XIII. How the Food is prepared in the Stomach and Intestine 67

XIV. The Care of the Stomach 71

XV. The Blood 75

XVI. How the Blood is Purified 83

XVII. The Need of Pure Air 87

XVIII. The Care of the Lungs 91

XIX. How we Move 96

LESSON PAGE

XX. How the Muscles do their Work . . . 100

XXI. How to make the Muscles Strong . . . 103

XXII. How the Body is Governed 109

XXIII. The Helpers of the Brain: The Spinal Cord and Nerves 116

XXIV. The Care of the Brain 119

XXV. The Special Senses: The Eye, and how we See 124

XXVI. The Ear, and how we Hear 131

XXVII. *Taste*, *Smell*, and *Touch* 134

XXVIII. The Covering of the Body: The Skin . 139

XXIX. Bathing 145

XXX. What shall we Wear? 149

XXXI. How shall we spend our Money? . . . 152

PRIMER OF HYGIENE

LESSON I

THE FRAMEWORK OF ANIMALS

HAVE you ever seen a turtle walking around with his shell on his back? Have you seen him draw himself inside until nothing could be seen of him except his shell?

If you tried to take hold of his foot, he quickly drew it out of harm's way inside of his shell. When he came out and walked about, you must have thought him rather a slow and clumsy fellow.

Perhaps, when you were at the seashore you saw a jellyfish washed up by the waves and left lying on the beach. It looked just about like a lump of jelly and seemed quite as helpless.

If you have watched both of these animals, you can tell why one was left helpless while the other could protect himself, and why one went where the waves sent it and the other went where he wished to go.

A **Jellyfish** as it appears when floating in the still, clear water. The umbrella-shaped part is clear and like gelatin. See the stomach hanging from the middle. The fine, threadlike tentacles hang from the edge of the umbrella.

Take your kitten on your lap and feel her legs and her back, being careful not to hurt her. Has she anything inside that feels hard like the turtle shell or is she soft all through like the jellyfish?

The hard part which you feel in your kitten and the hard part which you see on the turtle are both for the same purpose. They give strength to the animal, protect it from harm, and help it to move about.

The kitten's skeleton is inside, out of sight, while a part of the turtle's skeleton is outside, and the soft little jellyfish has no skeleton at all.

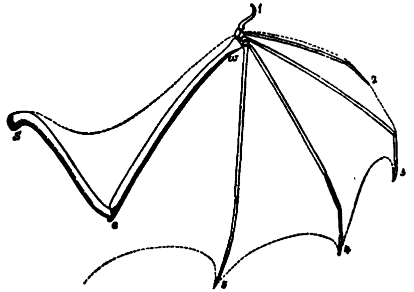
Are we without a framework like a jellyfish, have we an outside skeleton like the turtle, or an inside one like the kitten?

Feel your arm, your leg, and your fingers, and you will be ready to answer.

BONES OF THE FINGERS.

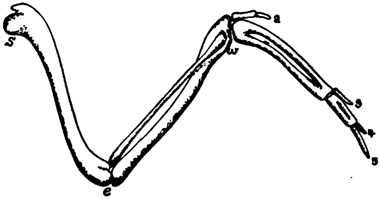
If, like the jellyfish, we had no framework, we should lie all together in a lump. If our framework were outside of us like the turtle's, we should be very slow and awkward. What we really have is a framework like the kitten's, and we can move where we wish quickly and gracefully, and can sit and stand erect.

All those animals which have backbones have also a framework much like our own.



The Bones of a Bat's Wing. *s* corresponds to the shoulder, *e* to the elbow, and *w* to the wrist. Find what part of the bat's wing corresponds to your thumb, to your index finger, middle finger, ring finger, little finger.

In each of these animals we find the bones somewhat changed to suit the needs of the particular animal.



Bones of a Bird's Wing. The end marked *s* corresponds to the shoulder joint, *e* to the elbow joint, *w* to the wrist. 5 corresponds to the little finger, 4 to the ring finger, 3 to the middle finger, 2 to the index finger.

The small bones which in our framework form the fingers, in the bat are joined together by a thin skin and form the wings.

In the bird the bones which correspond to our finger bones are only four in number, and are tightly bound together to form the point of the wing.

Horse's Hoof.

Cow's Hoof.

In the kitten and the dog these bones form the paws. In the cow there are but two of these bones forming the hoof, and in the horse there is but the one middle bone left, and that forms the whole hoof.

LESSON II

THE FRAMEWORK OF MAN

A SKELETON is a framework upon which something is laid or built.

We sometimes call the framework of a house or the outline of a story a skeleton, and for the same reason we call the framework of the body a skeleton.

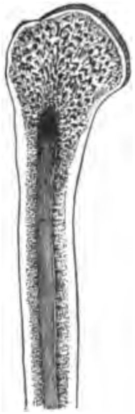
If the skeleton were all in one piece it might support the body and protect it, but it would not allow it to move.

Instead of being in one piece, it is composed of over two hundred bones, of many sizes and shapes. Some are long and round, some short and round, still others thin and flat, while all are just suited to our needs.

The long bones have a hollow part in the middle which is filled with marrow. This you have seen in meat bones. It is very soft and oily.

The part of the bone next to the marrow is quite spongy. Even the hard outside part is full of tiny holes, many of them too small to be seen without the help of a magnifying glass. They are large enough, however, to allow the blood vessels to pass through and carry food to the bone.

The bones which we find out in the streets or in the fields are not like the fresh bones which we cut from the meat before it is cooked. If you put the two together you will see a great difference. The fresh bone is still covered with a gristle-like skin, while the sun-dried bone has lost that.



Section of a Bone.

If you burn the bone, the animal part is burned away and only the lime is left. If you put a fresh bone into acid and let it stand, the lime will be eaten out and when only the gristle part is left the bone is soft enough to tie into a knot.[1]

The bones of children have much more of the animal part than the bones of grown people have, and that is why children can tumble about so much without breaking their bones.

The bones of old people have so much lime that they become brittle and break very easily.

During childhood, while the bones are so soft and easily bent, they should be trained to take the best positions.

---

[1] A soup bone — the shank — cut lengthwise will show the structure of bone. If this cannot be obtained, a chicken bone cut lengthwise will do.

Children can bring sun-dried bones and burnt bones. The teacher can dissolve out the lime with dilute muriatic acid.

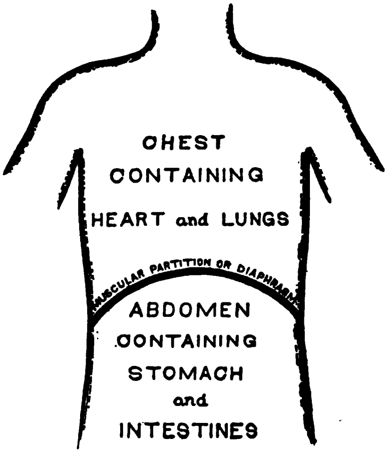
LESSON III

THE SKELETON OF THE HEAD AND TRUNK

The skeleton is divided into three parts, the head, the trunk, and the limbs.

The bones of the head form a case called the skull, in which are kept the brain to think with, the eyes for seeing, the ears for hearing, and the nose for smelling.

The skull has several openings through which the nerves and blood vessels pass to and from these organs.



Showing Trunk of Body divided into *Chest* and *Abdomen* by the Diaphragm.

The trunk is the part of the skeleton which supports the head and limbs. It is something like a chest with a division across. The upper part is indeed called the chest, while the lower part is called the abdomen. These parts are separated by a wall of muscle.

The backbone extends from the skull down the whole length of the trunk. This is the most wonderful of all the bones, for it is not one long bone, but a chain of bones. These are held together by gristle. Between the bones is a little cushion of gristle, to keep the bones from jarring upon one another.[1]

From the backbone twelve curved bones extend forward, part of them joining the breastbone. Feel your sides and see if you can count the ribs and find the three that are not joined to the breastbone.

At the upper part of the chest, in front, are the two collar bones, while the shoulder blades are in the muscles of the upper part of the back.

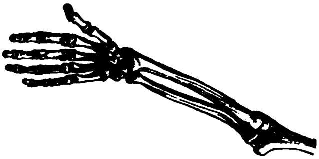
---

[1] The chicken or turkey neck shows the structure of the backbone.

THE SHOULDER BLADE.

The limbs are joined to the trunk. By the skillful use of the limbs we are able to walk, run, jump, climb, throw, carry, pick up things, and do all of the little delicate work which the fingers are able to do.

In the upper arm there is one large bone, but in the forearm there are two bones which cross each other to give us that twisting motion which we use so much.



THE BONES OF THE FOREARM.

The lower limbs are much like the upper ones, except for the little bone at the knee, called the knee pan, and for the arch made by the bones of the foot.

LESSON IV

HOW THE BONES ARE JOINED TOGETHER: JOINTS

HOLD your arm out stiff and straight with the fingers extended. Now begin to bend your fingers, hand, and arm. Count the number of places where you can make a bend. In each of these places the ends of separate bones come together and join in such a way that they can move upon each other. These meeting places are called joints. Find the joints in a jointed ruler. We have already seen that the skeleton is formed of many bones, and that these are joined together in some way so that they form one complete skeleton and yet are able to move separately.

Do the joints of the ruler bend in the same direction? The joints of the body are made to bend in different ways so as to give different motions. In how many ways can you bend the joints of your fingers? In how many ways can you bend the wrist? If all of the joints of your thumb could bend only in the same direction as those of your fingers, you would not be able to pick up small objects with the thumb and forefinger. When next you visit the park or the zoölogical garden notice the way a monkey takes hold of small objects.

The upper part of the long bone of the arm is rounded at the end to fit into a hollow or socket in the shoulder blade. This is called a ball and socket joint. The long bone of the leg fits into the hip bone with the same kind of a joint.

At the elbow the bones join like a hinge. Such a joint is called a hinge joint. We have others like it in the knee joint, the ankle and the finger joints.

You have seen your mother put oil on the joints of the sewing machine, or your father put oil upon a squeaking hinge, or an engineer put oil upon the joints of his engine. You know that after a time none of these joints would move if they were not oiled. The same thing is true of the joints of the body. They are not exactly oiled, but they are kept moist by a fluid.[1]

People sometimes get a stiff neck from sitting where a draft of wind blows upon the neck. The joints of the neck become swollen, and to move them causes pain.

---

[1] The joints of the chicken before it is cooked show the sinovial fluid very well. The chicken shank shows the tendons as shining cords and the ligaments as broad bands, cut off when the joint is cut through.

The joints of old people sometimes become stiff from hard work, age, or wrong kinds of food, and they cannot make the quick, easy motions that children can. Thus a boy or girl finds only pleasure in stooping to pick up an object, while to an aged person such a movement would be painful.

A joint is simply a place where the bones come together. They are held together by firm strong cords or ligaments which are fastened into the bones.

The ligaments are bound tightly around the bones and extend from one bone to the other, holding them securely together.

LESSON V

THE CARE OF THE BONES

THERE is an old story about a man who took his little son out walking with him one morning in the apple orchard. Presently they came to a very crooked tree. The man called to his gardener to bring a team of horses and a strong ox chain. Soon the gardener came with the horses and the chain. The gentleman ordered the gardener to put the chain around the crooked tree and hitch the horses to it to see if they could not straighten the tree.

The gardener did as he was told, and the horses pulled with all their might, but they could not make the slightest change in the trunk of the tree.

Presently the gardener said: "It's no use, sir, trying to straighten the tree now. It's too late. It should have been taken when it was young and tied up to a straight pole, and not allowed to grow crooked. When it is grown you cannot change its shape."

This was just what the gentleman wished his son to hear, to teach him the importance of beginning to grow right in his youth.

This is a very good story to remember when we are studying about the skeleton. It is plain to see that the form of the body will be just what the shape of the skeleton is, for upon that all the fleshy part of the body is laid.

If we wish to have an erect form and a good gait we must take good care of the bones.

The bones are very soft and easily bent during childhood. It is during this time that the habits are formed which make the body straight and beautiful, or crooked and unsightly.

The child who slides down into his seat, the one who bends over his book, and the one who stoops over when he walks, will not have a straight backbone.

Standing with the weight all on one foot, or sitting on one foot as girls sometimes do, will injure the shape of the body.

Pupils who sit with one shoulder high up on the desk and the other dropped down will have one shoulder higher than the other when the bones become hard and cannot change.

Little Ellen had grown round-shouldered. Instead of walking erect she leaned over, and when she sat down her shoulders drooped.

Her mother saw how this would injure her little girl, and often told her to sit up straight and to hold her shoulders up. But Ellen had heard this so often that she thought very little about it and did nothing to help it.

Uncle Elmer thought he knew how to cure those shoulders, so he invited her to spend the summer at his country home.

Ellen was very happy to think of going to see her aunt and cousins and playing about on the farm.

Every day the children had some work to do. There was the sweeping in the house and hoeing and raking in the garden. Then came the fun. They climbed up into the haymow and tumbled about in the hay. Ellen learned to climb trees as well as the boys could, and Uncle Elmer made a seat high up in a big tree where the children could sit among the leaves.

Ellen liked best to row the boat on the lake. Here they spent much of their time and became as brown as berries.

At last the summer was over and Ellen

went home. It made her mother very happy to see her look so well and to find that her back was straight and the shoulders held up in their place.

Tight clothing about the waist presses the ribs close together and makes the space within the walls too small to hold the organs in their right

Tight shoes press the
and produce an awkward
heels throw the weight u
give one corns, ingrowin
other painful ailments.

Even if we take all th
throw the shoulders back when we sit or walk, and to wear proper clothing, we might still have a very badly formed skeleton if we did not give it the food which it needs to make good strong bone.

In one city in Europe there are more people with bowlegs, hunchbacks, and other crooked shapes than anywhere else, and it

intendent of the Illinois State Re
namely, that 92 per cent of the you
inals in that institution are cigarett
and 85 per cent of them cigare
Sewer gas is dangerous to life and he
is less likely to make a criminal of
cigarettes.

Criticism: "Contrary to page 2
diseases those caused by alcohol an
companying the alcohol habit are
most likely to be inherited but are n
cious,' we believe the diseases ind

is said to be because the children do not have the right kind of food.

These little children live upon rye bread and black coffee.

So much of the bone is lime that the food must supply lime to them for their growth or they cannot be strong.

If so much depends upon what one eats and drinks, it will be well to study foods, find out what they contain, and how to build up the body from them.

LESSON VI

WHAT THE BODY NEEDS

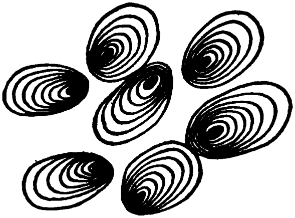
THERE is an old German proverb that says, "One is, what he eats."

If this is true it will be easy to make ourselves what we wish by eating the right food.

What is the right food?

Nature is a good mother; let us see what she feeds her children, and perhaps we can learn from her.

Look at a grain of wheat which has been soaked in water for three or four days. With your knife peel off the outside part. That is the skin. Now cut away the next part, until you come to the little speck at the bottom. That is the baby plant, and the part which was all around it is the food which the mother put there for it to eat before it was old enough to work for itself.



A number of starch grains or particles as they would look through a powerful microscope. The little dot one side of a particle is the place where it began to grow. From that point the starch grain grows by adding layers which are thicker at one side than at the other. This causes the curious appearance of the starch grains.

Put several wheat grains into your mouth and chew them, and they become gummy from a kind of albumen which is with the starch of the grain. The starch can be seen though a microscope as tiny grains.[1] The grain also contains some mineral salts and oil, which are not so easily seen.

---

[1] Any one can extract starch from grain or potato. The grain has to be taken just when it is in the right state of growth, but potatoes can be taken any time. Grate two good-sized potatoes into a quart of water. Rub the pulp well until the water is milky. Strain through a fine sieve or coarse cloth, into a fruit jar or a pan, and allow it to settle. After it has settled pour off the water and allow the starch to dry.

Albumen, starch, mineral salts, and oil are then the foods which the wheat mother gives to her little ones.

The same food is given to the corn, wheat, and rye plants.

The egg is the food which the chicken and bird mother give to their babies before they can pick up for themselves. Let us see what that contains.

The white is albumen, the yolk is a kind of albumen made yellow by oil, and there are some mineral salts. Albumen, oil, and mineral salts, then, are the foods for birds.

The cow gives milk to feed her calf until it can eat grass.

What does milk contain?

Set a pan of fresh milk away over night, and in the morning you will find a layer of cream on the milk. This is the oil. The sweet taste of the milk comes from sugar.

After the milk turns sour, if you boil it you can separate the solid from the liquid part. You will find that the largest part of milk is water. The liquid part also contains mineral salts and the solid part is the albumen.

Albumen, sugar, oil, and mineral salts, then, are the food for young animals.

Young children need just about the same kind of food that other young things need, and we find that our wants are albumen, starch, sugar, oil, minerals, and water.

Cereals, eggs, and milk are the only foods which contain all that a person needs. In eating a variety of food we get one kind from one thing and other kinds from other things.

LESSON VII

WHY DO WE EAT?

YOU will answer, because we are hungry. That is quite true, but back of that comes the question, Why are we hungry? That is not so easy to answer.

We are hungry because the body needs food. If one never grew hungry, he might forget to eat, and the body might be injured before he thought of it again.

All the running, playing, and jumping that a child does, and the work which a grown person does, wears out the body. This loss must be made up by new material or food.

All the growth which a child makes from the time he is a baby until he has his full size must come from the food.

The heat which the body has also comes from food.

The child who is unable to run about and play does not need so much food as the one who is active.

The man who sits mending shoes does not need so much to eat as the farmer who walks back and forth in the field planting corn.

Boys and girls who are growing fast need more food than those who are not growing so fast.

People who live in cold countries need more food than those living in warm ones.

It might seem that one kind of food would do just as well for the body as another kind, and that what would build up one part of the body would build up all parts.

Let us look again at the plants. If one were to pour the salt water from the ice-cream freezer upon the grass, after a few days he would find a brown spot where the salt had killed the grass. But if he poured it upon the asparagus bed, instead of killing the asparagus, it would make it grow even better and stronger.

A farmer sows grain in a certain field. When it comes up it grows slowly and turns yellow, while the same kind of seed in his neighbor's field grows green and flourishing. The farmer says: "This is poor ground. I must fertilize it and make it richer." That means that the food for this kind of grain has been used from the ground, and until more of it has been added the grain cannot grow.[1]

---

[1] Have several corn and wheat plants growing. Water one daily with salt water and one with fresh, and note the result.

Different parts of the body need different kinds of food.

A food which will build up one part of the body will not always build up other parts. Some foods merely keep the body warm and do not add to its growth.

Not everything which we eat is food. Many things which we eat do not nourish the body. Still the body must work hard to take care of this material and pass it on until the body can get rid of it.

LESSON VIII

WHAT SHALL WE EAT?

THREE little kittens which had been fed entirely upon milk, and which were as loving and peaceable as kittens could be, were given raw meat three times a day to see what effect it would have upon them.

The kittens grew very fast, but were no

longer so peaceable and loving as they had been. After a few weeks they became so fierce and quarrelsome that it was almost dangerous to go into the room where they were.

The kittens had always been well treated, and the only change made in their care was the change in diet. Does it not seem that the meat diet made them uneasy and cross?

The lion and the tiger, the wolf and the hyena, are all meat-eating animals, and are all fierce, wild, and quarrelsome.

The cow, the sheep, and the horse, which live upon grass and vegetable food, are peaceable.

People who live upon a meat diet are likely to become restless and even quarrelsome.

Meat is a nourishing food, but from the albumen there is formed a substance which makes one irritable so that it is best not to eat much of it.

It is better to get albumen from b
peas, cheese, milk, and eggs.

These foods are not all of them ea
digest, and it is well to eat plenty of graham bread, whole wheat bread, and corn bread with them to make them less rich and easier to digest.

Fatty foods keep the body warm. Those fats that are not cooked, such as butter and olive oil, are the best kinds to eat.

Sugar, and starch are also heat-making foods. Pure candy, if not eaten in too large quantities, and if taken at mealtime, is a good food.

Do you think you ought to eat as much butter, sugar, and starch food in the summer as in winter?[1]

See if you can name some starch foods besides corn and potatoes.

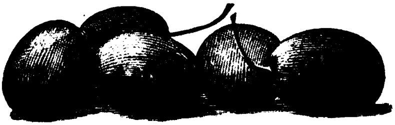
---

[1] Connect with the geography lesson by comparing foods of people in a cold climate with those of people in a hot climate.

Some children do not like cereal foods and do not care for graham bread, but these and milk contain what the bones need to make them strong.

If a child wants bones that will not bend into crooked shapes, he would do well to eat these foods, even if he does not like them very well.

If one had plenty of all the foods we have mentioned, he would still not be perfectly fed. One ought to have the acid of fruit and the acid and minerals of certain vegetables.



Almost every one likes fruit, and, as it is cooling, it can take the place in summer of some of the heat-making foods which are used in winter.

LESSON IX

WHAT SHALL WE DRINK?

ONE thing which the body needs even more than food has not yet been mentioned.

A large part of the body is water, and we must keep giving water to the body to keep up the supply.

One suffers more quickly from want of water than from want of solid food.

There is water in almost everything we eat. Cut a potato into small slices and let them lie in the sun. Soon the water passes away, and the pieces of potato are left very small and shriveled.

A large part of meat and vegetables is water, and water is added to almost everything we cook, but still we need more water.

A good drink of water an hour before breakfast washes out the stomach and leaves it in better condition to receive food.

Water taken at mealtime helps to digest the food. But it should not be taken while there is food in the mouth.

If the water is very cold it should be sipped, to allow it to warm a little before it reaches the stomach. Water is nature's drink, and nothing else can take its place.

Milk has already been spoken of under foods, but it is also classed among the drinks, as it is a liquid.

Milk cannot be taken at all times as water can, but must be taken at regular mealtimes, or it injures the digestion just as irregular eating does.

Tea and coffee are drinks much used, but every one would be better without them. They should never be used by children.

Coffee and tea in themselves contain no food, and they are likely to make children irritable and to stunt their growth. They keep one from feeling the need of food, too, so that one uses them sometimes instead of good, nourishing food.

Some people think that wine and beer and other alcoholic drinks are foods or help to digest food. Beer contains so little food that a whole barrel would not contain enough nourishment to feed a man one day. You see that it does not pay to buy so much water to get so little food. Besides, beer and wine do not quench thirst as pure water does, for the alcohol creates a longing for more.

Cider, wine, root beer, all contain alcohol, and are not good drinks to take. The juice which is pressed from the grapes or apples, if used as soon as it comes from the fruit, is harmless. It is then fruit juice. If it is boiled and canned with a little sugar, just as fruit is canned, it is also harmless. But if it stands open to the air, in a few hours it begins to "work,"[1] and then there is alcohol in it, and the longer it stands the more alcohol there is, unless another change takes place, which turns the juice to vinegar.

Neither alcohol nor tobacco supplies anything for the growth or mending of the body.

A great doctor says that all the alcohol in the world would not make one drop of blood, one nerve, or one fiber of muscle, but it would waste the strength and produce decay.

---

[1] Alcohol may be made by fermenting grape juice.

An English doctor says that even small doses of strong drink keep the body from growing properly, make it less strong, and shorten life.[1]

Why does one quickly suffer from want of water?
In what do we get a large part of the water we need?
Why is milk a better drink than tea and coffee?
When is the best time to drink milk?
Why can we not quench thirst with beer and wine?
When are apple juice and grape juice good and healthful?
How may they be kept so?
How are they changed into unhealthful drinks?
In what three ways is the body injured by drinks containing alcohol?

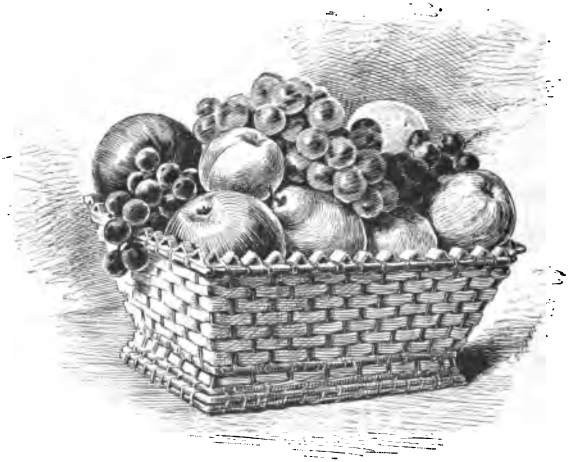
---

[1] Water one corn plant daily with pure water, and moisten the other daily with alcohol, and note results.

LESSON X

SHALL WE DRINK THE JUICE OF FRUITS?

Look at this basket of beautiful fruit. See if you can name all the fruits you find



there. Can you tell from which part of the country they come?

See those fine grapes and apples. How much we enjoy eating them!

These fruits contain a juice that is cooling and refreshing in warm weather and healthful at any time, that is, any time when the fruit is fresh. When fruit begins to decay it may make one sick to eat it.

In some parts of the country, instead of eating all the fresh, ripe fruit, and getting the juice that way, a part of it is put into presses that squeeze out the juice.

If this fruit juice were cooked right away with a little sugar, and were put, while hot, into fruit jars and sealed, it would make a delicious drink.

Sometimes the fruit juice is pressed out and left open to the air, and then a change takes place. After this change the apple juice is called cider, and the grape juice is called wine. One can hardly think that the pure air which we breathe could work such a change in the fruit juice as to make it harmful to drink.

Indeed, it is not really the air that does the harm. Perhaps you will understand better when you have heard the whole story.

While the apples and grapes are still growing dust collects upon them. This dust has in it the seeds or spores of a tiny plant called the yeast plant.

When the fruit juice is pressed out of the fruit these spores are washed from the outside of the fruit into the juice. If the juice is boiled the spores are killed and cannot grow; but if it is not boiled, and is left where the air is moderately warm, the spores begin to grow.

When plants or animals grow they must have food. The yeast plant gets its food from the sugar of the fruit juice. The sugar is then changed into two new things. One of these passes off in bubbles, the other

"On page 53, alcohol is called a poison."

remains in t

is alcohol, a

When the

grape or ap

in it, and v

Fermentation shows that a change is taking place in the thing fermented.

App [redacted]

when

contai

chang

wine. Cider and wine are unhealthful because [redacted]ntain alcohol.

A v

make

one wa

milk w

him. But the alcohol that is in cider, wine, and beer has the power to create a desire for more, even when one takes only a little.

There are many people in the world who drink so much of the liquors containing alcohol that they are made sick and stupid. They cannot work. They cannot support their families. They are a cause of pain and grief to all who know them. They are called drunkards.

Some one has just asked a great many of these drunkards how they came to be what they are. A large proportion of them say

e when

en they

e glass,

y want

knows

is good for him, even if he does not like it very well, and refuses what he knows is not good for him, he exercises self-control. Complete self-control is so difficult that a wise man has said, "He that is slow to anger is better than the mighty; and he that ruleth his spirit than he that taketh a city." Self-control requires the best strength of a strong mind. But a very little alcohol has the power to weaken that part of the mind which gives one strength for self-control.

This is not the case with milk and water and sweet fruit juices that have no alcohol in them. They do not weaken the mind. They do not make one lose his self-control. These are the drinks one should use, and not the ones that contain alcohol.

What causes a change in the juice of fruits after it has been pressed out?

How and when does the yeast plant get into the pressed-out fruit juice?

What part of the fruit juice do the yeast plants change?

What is the nature of alcohol?

Why are cider and wine unhealthful?

Besides the danger of being made ill, what other danger is there in drinking wine, beer, and cider?

How does the person who has self-control differ from one who has no self-control?

How does alcohol affect one's power of self-control?

What are the drinks that will not weaken one's self-control?

LESSON XI

OVEREATING

DID you ever see a little boy or girl eat and eat and eat of something which he liked very much, until finally he could not eat any more? Did you notice how uncomfortable he looked? He did not care to get up from the table or to walk about. One should use just as much of anything as he needs, and no more.

If one keeps on eating after the body is fed, just because the food tastes good, he is liable to make himself ill.

Suppose that one child eats and drinks what is best for his body, even if there are other things that he likes better, and will not eat the things which he likes best when he knows that they are not best for him. Suppose that another child eats and drinks whatever he wants, no matter if it does harm him, and will not eat a thing which he does not like, no matter how much he needs it.

Which of these children will have the stronger body? Which will have the stronger mind? Which will be better able to do the hard things of life?

Which one of these will say yes and which will say no when he is asked to drink wine or cider? Both have learned that these drinks contain alcohol, and that alcohol injures the body. Both know that alcohol, even in these light drinks, has the power to make one who at first takes only a little want more, and that drunkards are made in that way.

Some friend says to them, "Just taste and see if it is good." The first boy says: "No, it is harmful. I do not want to know how it tastes."

The second boy has always yielded to taste, and he wants to know how they taste. He is not able to say "no." He has not learned self-control in eating, and he soon yields to temptations to drink.

If you want to be strong men and women, be strong boys and girls.

Now that you know that tea and coffee are harmful, be strong and say, "Then I will not drink them, for I want the best body I can have."

Did a boy ever think that tobacco and cigarettes were good for him?

Nobody ever told him that he would grow bigger or stronger or wiser by using them.

Nobody ever told him that he could think faster or run faster, get his lessons better or win more games, by using tobacco.

He has perhaps been told that to smoke

will make him appear manly, but never that it will make him *be* manly.

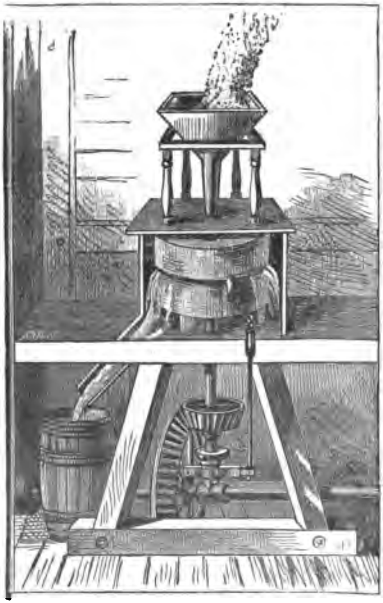
What honest boy wants to appear to be something instead of *being* it?

Boys are sometimes told that smoking will make them *feel* good. Perhaps it will for a very short time, but that is because it dulls his other feelings, and when this feeling is gone it leaves a worse one in its place.

No thinking boy wants to give up being manly, healthy, and clear-headed, just to appear like a man with a bad habit, and feel a little pleasure which soon goes away to leave him feeling worse than before.

LESSON XII

HOW THE FOOD IS PREPARED IN THE MOUTH



If you should visit a mill where grain is made into flour, perhaps the miller would let you look into the hopper where the whole grain is poured. The coarse kernels of the grain are there crushed into fine meal and flour. Nearly all the grains we use for food are first ground in mills before they come to us in the form of flour to be made into bread, or meal for muffins and Indian bread, or of cereal breakfast foods, which are only coarsely ground.

The hen carries her own mill about with her and grinds her food after she eats it. This mill is the hen's gizzard, which you have probably seen the cook open when she was preparing fowl for dinner. In it were little stones and broken kernels of corn which had not yet been ground.

Suppose one eats a handful of "pop-corn." Where and how is it ground, and what are the grinders? Two rows of hard, sharp teeth are the grinders, and the mouth is a little mill for grinding, which we always have with us.

If man had no more work to do than the hen has he might perhaps grind all the grain he uses with his teeth; but he has so many other ways of using his strength that he finds it more profitable to pay the miller for grinding his hard, coarse grain. When made into flour and then into bread it takes less work to eat it.

But bread as well as many other foods needs to be very thoroughly chewed before it is swallowed, and for this reason the teeth are very important parts of the body.

Until a child is six years old he has but ten teeth in each jaw. Look at your little sister's or brother's teeth, and you will see that they are not all alike. Look at the kitten's teeth and see if they are different from the child's teeth. At six years these teeth begin to loosen and come out one by one, usually pushed out by the second set. These have been growing in the jaw just beneath the first set.

In the second set there are sixteen teeth in each jaw. These teeth are intended to last a lifetime. Sometimes they do not last more than half a lifetime. This is because they are not well cared for and because they are not made of good strong material.

As you do not want to have your teeth pulled and so lose the help they give you, take care of them. Give them plenty of cereal food, milk, and graham and whole wheat bread. See that they are cleaned once or twice a day with a soft brush. Pick the food out with a soft wooden or quill toothpick, never with a pin or other hard substance. Let the dentist look at them once a year to keep them from decaying.

No one who uses tobacco will have white teeth.

In a little while they become a brown color, which is not at all pretty and which will not come off when they are brushed.

Teeth are often spoken of as pearls, but they do not look like pearls after they have been stained with tobacco. White teeth add a charm to the plainest face. The teeth are for grinding the food. Every mouthful should be chewed a long time before it is swallowed.

Have you noticed what happens in your mouth when you think of something which you like to eat? The water that comes into your mouth is the saliva. This mixes with the food as it is chewed and moistens it, making it easy to swallow.

If you swallow the food without chewing it a long time, the food is left in lumps that are too hard for the stomach to digest without working very hard. Besides, it is then not properly mixed with saliva before it comes into the stomach.

Chewing gum wastes the saliva, but tobacco wastes it much more, and not only chewing, but also smoking tobacco, wastes the saliva. When the saliva is wasted one becomes thirsty. The throat becomes dry and one wants to drink. When one is thirsty so much of the time he is likely to look for something else than water to satisfy it. Then begins the running to soda fountains, the drinking of lemonades, and eating of ice cream at odd hours, not because they are needed, but just because they taste good. If this is done very much it becomes a habit to satisfy one's senses even if it harms the body.

Let the saliva gather in your mouth; swallow it, and feel your throat with your hand as you do so. The lump which we call the "*Adam's apple*," or "voice box," rises under your finger. This brings the upper open end of the voice box under the root of the tongue, so that the food can slip over it and not get into the windpipe.

There are two openings in the throat, — one for the air to pass to the lungs, and one for the food to pass to the stomach.

Have you ever wondered how the food could find its way into the right passage? Sometimes it does get into the windpipe, and then one has to cough until it comes back again.

It is not by accident that the food goes into the right place, but because there is a little lid or cover over the top of the windpipe, and when one swallows, this lid helps to protect the windpipe and keep the food out.

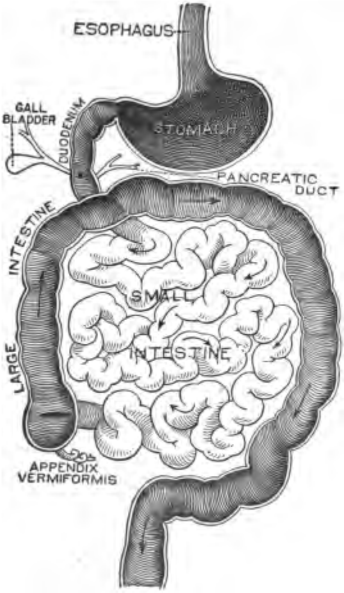
LESSON XIII

HOW THE FOOD IS PREPARED IN THE STOMACH AND INTESTINE

If you should warm a quart of fresh sweet milk and stir into it a tablespoonful of liquid *rennet*, which you can buy at the drug store, and set it away for a few hours, you would see a very great change in it. You could no longer pour it out of the bowl as you can water, and as you could the milk when it was fresh. It has changed into a thick, solid substance, which you can cut with a knife or spoon. It was the rennet that made this change.

When you drink sweet milk the same change takes place in it after it reaches your stomach. There is something in the stomach which causes this change.

Other substances besides milk are changed when they reach the stomach. That is what the stomach is for, to change meat and other foods in such a way that they can become a part of the body.



The work which the stomach does is very wonderful. You would no doubt like to see how the stomach looks.

Here in the picture you can see the shape of it, and where the food goes into it, and where it empties out. It is big enough to hold three pints, and the inside is lined with skin that has many soft folds in it. This skin feels soft to the touch.

The lining of the stomach makes a juice, called the gastric juice, which dissolves the food when it comes into the stomach.

When the food is fine enough it passes through the opening into a long tube, about four times as long as the body.

In this tube, called the intestine, the juices digest all the digestible part not already digested by the stomach, while the waste passes on to the large intestine.

You may wonder where there is room in the body for such a long tube, but it is coiled about so as to take up very little room, and is kept in the abdomen.

When the food has passed a little way in the intestine it is ready to be taken up by the body to build up new parts, to mend worn-out places, and to keep the body warm.

How can it get from the intestine into the body and become a part of it?

If you should make a little bag out of fine white muslin, set the bag into a tumbler, and pour water into the bag, you would soon have water in the tumbler outside of the bag. You were very careful not to pour any outside of the bag, so it must have soaked through the bag.

That is the way the food that has been changed in the stomach and intestine gets out to become a part of the body. It soaks out. Perhaps you see now why the food had to be changed in the stomach and intestine. It had to be dissolved into a liquid so that it could soak out.

In the walls of the intestine are many, many tiny blood vessels, whose walls are so thin that the food can soak through.

The digested food, which has now become thin and watery, passes into these little blood vessels. It is now a part of the blood, and is carried in the blood vessels all over the body.

LESSON XIV

THE CARE OF THE STOMACH

THREE little girls who lived in the country went once to visit some cousins who lived in New York. The city cousins wished to give the country cousins a good time, so they spent one whole day taking them around the city to see the sights. They went all through Central Park, and the museums, and the picture galleries. There was so much to see that

they did not stop until they were all so tired they could scarcely walk to the cars to go home.

Suppose one had to work all the time without stopping to rest. How long could one do it? Scarcely one whole day. Everything that works needs to rest a part of the time.

Did you ever think before how much work must be done upon the food before it is really ready to be used by the body? Now you will understand how hard the stomach and other organs have to work.

You would not keep well if you never took time to rest. Neither can the stomach keep well if it is working all the time.

It takes two or three hours to digest a meal, so if you wish to give the stomach any time to rest, be sure you do not eat between meals, but always eat at the regular times each day.

The stomach gets into habits just as you do, and like you, it does things that it is in the habit of doing better than it does other things.

When it is in the habit of digesting at a certain hour of the day, it gets everything ready beforehand, and soon has its work under way. But when the food comes at an unexpected time the stomach is not ready. The juices do not flow readily, and therefore the work is much harder for the stomach to do.

The work of the stomach is to soften the food and dissolve it. Anything which hardens the food makes it less easy for the stomach to dissolve.

Alcohol hardens the food. Have you seen flowers and fruits preserved in alcohol? They are kept because they become hardened.

Alcohol is irritating, too. If it is rubbed upon the skin of the arm it makes it smart. The inside lining skin is much more tender than the skin of the arm. Alcohol in the stomách hinders the digestion of food as long as it is there. If alcoholic drinks are used for a long time, they may injure the lining of the stomach. This makes it less able to prepare the juice for digesting the food.

Tobacco contains a poison that is very harmful to the stomach.

People who smoke sometimes say they do it to help digest their food. Tobacco cannot do that. It can only hinder the digestion.

LESSON XV

THE BLOOD

IF you prick your finger the bright, red blood flows out. In fact, if you prick yourself anywhere deep enough, the blood flows out.

The only parts of the body which have no blood are the hair, the nails, and the outer layer of the skin.

It is the blood that gives color to the lips and the rosy tint to the skin.

The blood would not be red but for millions of red particles which float about in it.

It is because there are so many of these that the blood looks so red.

These particles are the vessels for carrying air in the blood.

The food is all in the colorless liquid part of the blood.

Hold a leaf up to the light and see the lines which seem to divide and divide again, until they go to every part of the leaf.

A maple leaf showing the veins. Notice how the large veins branch into smaller ones, and all parts of the leaf are supplied with the sap brought up from the roots.

Those are the veins along which the sap flows and carries food to every part of the leaf.

In our bodies there is a set of veins or tubes which carry the blood over the body.

The sap flows in only one direction, and flows only as fast as it is used by the plant.

Some of the water from the sap used by the plant evaporates or passes into the air. In our bodies the blood flows out to the surface and then comes back to the heart, which sent it out. Then it makes another circuit, then another, and so on, circulating over the body. Now you know why we call it the circulation.

The power that sends the blood out is the heart, which is to the body what the pump is to the city waterworks.

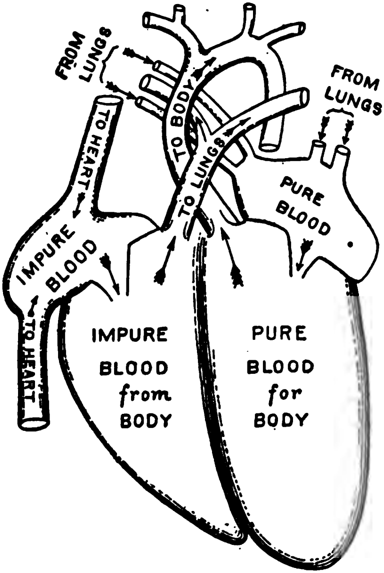


Diagram of the heart, showing where the blood enters and leaves the heart.

Look at this plan of the heart and you will see that there are two parts or rooms in it, which do not open into each other. See the large tubes from which the blood empties into the heart and those through which it is pumped out again.[1]

---

[1] A turkey's or sheep's heart will show the structure.

The tubes that carry the blood to the heart are the veins, and those that carry it away from the heart are called arteries.

The bright, red blood flows in the arteries, but that which flows in the veins is a darker color, almost purple.

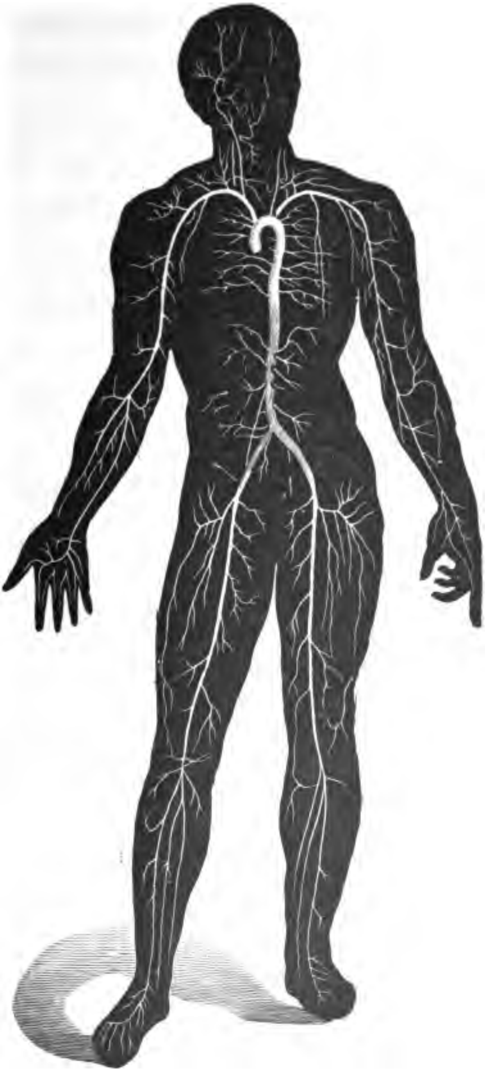
The dark blood in the veins is the impure blood which has been over the body and is coming back to the lungs to be made pure again.

Just how that is done, we shall learn later.

After the food has been digested it is emptied into the veins. Through the veins it is carried with the impure blood and emptied into the right side of the heart. The heart pumps it out again to the lungs.

When the blood has become pure in the lungs, it goes back to the other side of the heart. From here it is pumped out again into the large tubes or arteries.

These large arteries send branches to the



The Arterial Circulation.

head; one branch to each arm, one to each leg, and other branches to other parts of the body.

Does it not puzzle you to know how the blood feeds the body when it flows along in closed pipes or blood vessels? It is a wonderful thing. The blood vessels divide and subdivide until they become very fine and small, like the smallest veins in the leaf we looked at.

These smallest blood vessels have walls so thin that the blood can ooze through into the body.

The used-up, worn-out materials can also ooze through into the tiny vessels.

From these tiny vessels it is emptied into larger ones, and by these it is carried back to the heart.

The blood is made of what we eat and drink.

If it is good food it makes the body strong, but if it is not good food it either makes the body work very hard for nothing, or it does the body real harm.

Alcohol does not feed the blood, but poisons it. It injures the little red particles which carry the air. That means that they are not carrying so much pure air to the tissues of the body as they ought.

When the red particles of the blood cannot take up the pure air as they ought, they cannot carry off the waste as they should, and the blood becomes loaded with waste material and poisons from the body.

Did you know that tobacco contains a very deadly poison? It is so deadly that if a tobacco chewer were to swallow all the juice of the tobacco he chews it would kill him, for the poison would get into his blood. People do not swallow all the juice, but spit it out. But even in this way some of the poison gets into the blood.

If you knew that certain berries which

you find in the woods were poison, would you chew them anyway, saying you would not swallow the juice but would spit it out?

In smoking, some of the poison enters the lungs, and some of it gets into the mouth from the touch of cigars and cigarettes to the lips.

LESSON XVI

HOW THE BLOOD IS PURIFIED

EVERY morning after we get up from our beds we throw them open and open the windows to let the fresh air blow upon them and purify them. When clothing has been hanging in closets or packed away in trunks or chests, we take it out and hang it on a line for the air to blow through it and purify it.

If any utensils about the house get a bad odor they are put out into the air to sweeten.

Dirty clothes are washed in water and

then hung out to dry in the open air. If they are dried by steam heat instead of by sunlight and air, they do not have the same sweet smell, and are really not so clean.

The blood in the body is also purified by the air.

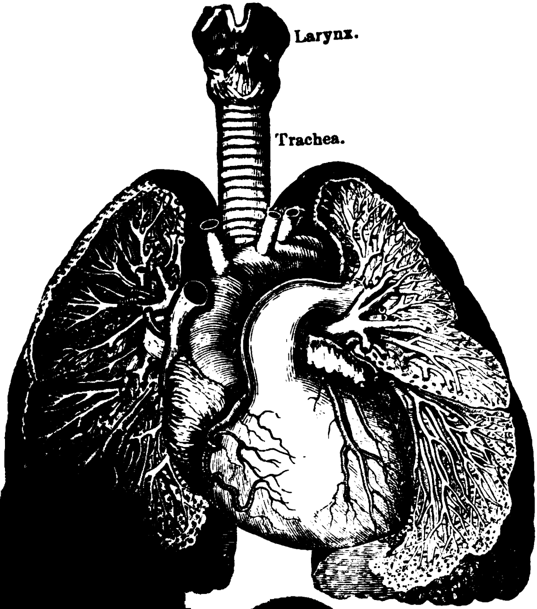
Put your hand upon your chest and breathe. See how much larger it becomes when you draw in your breath. That is because you make the chest larger and that allows the air to flow in.

How does the air get into the body, and how does it get into the blood?

Close your mouth and you can feel the air passing through the nose.

Always take it in that way, for there are little hairs in the nose which keep any dust particles from going through. It is warmed there, too, before going to more tender parts.

From the nose the air goes into the throat and down the windpipe. At the end of the windpipe there are two branches, one going to each side of the body into the lungs.



[illegible] t.

[illegible] ranch again and [illegible] ery fine indeed. [illegible] ube is a little

When the air is drawn in it passes through these large tubes and then through the little ones, until it gets into the air sacs at the end.

The skin of these sacs is so thin that the air can pass through.

Just where these air sacs are there are many, many of the tiny blood vessels which we have talked about.

You remember that the walls of the smallest blood vessels are thin enough for the watery part of the blood to pass through. They are surely then thin enough to let the air pass through. That is just what happens.

The blood comes to the lungs and flows into the very small blood vessels. It gives out the impurities which it has collected from the body and takes air from the air sacs.

We fill our lungs with air to purify the blood. When we breathe out we throw out the impurities which the blood contained.

LESSON XVII

THE NEED OF PURE AIR

PERHAPS you can remember some cold day in winter when you stayed in the house all day because you thought it was too cold to go out. The doors and windows were all

kept tightly closed, for as soon as they were opened a gust of cold air blew in that made every one shiver.

But you remember that in the afternoon your cheeks grew red and hot, and your head ached. You did not care to play, and you could not read your storybook, and when at last you went to the door and got a whiff of the outside air you wanted more. You had breathed the air of the room over and over again, until it had become very impure, and your body was almost starving for pure air. Then you wrapped up warm and went out doors for a good run, and while you were gone some one opened the doors and windows and let the cold air come in and blow all the bad air out. Then when you came in you felt like a new person, and could sit down and read your storybook with a relish.

This shows how much we need pure air.

When the blood leaves the lungs, instead of looking a dark, purplish red color, it is a bright red color, and is ready to go back to the left chamber of the heart.

From here it starts out to make the round of the body, and to give out to each part just what it needs the most. We have already said that we fill our lungs with air to purify the blood, and that when we breathe the air out it is full of impurities which the body casts off. The air cannot purify the blood unless it is *pure* air.

Air which has been breathed over and over again is not pure air. Indeed, it is very impure air, and will not make the blood red.

To keep the blood in good condition one must not only eat good food, but must breathe pure air.

Breathing bad air makes one pale and listless, just as eating bad food does.

Both by day and by night there should be some way for the pure air to come into the house and for the impure air to go out.

When one wakes from sleep with a headache it is nearly always because the air of the sleeping room was not pure.

Some people think that if a bedroom is aired in the morning it is enough to keep the air pure. But it is not enough simply to air a room once a day. The air must be changing all the time when any one is in it, because it is all the time being made impure.

In a schoolroom, where so many are breathing the air, it very soon becomes impure unless the fresh air is coming in constantly.

If there is no system of airing the room a good way is to put a flat stick as long as the window is wide under the window, filling up the space made by the opening. Then the air will come in between the two sashes.

LESSON XVIII

THE CARE OF THE LUNGS

LET some one measure your chest with a tape measure just after you have breathed out a long breath of air. Now draw in a good full breath and let some one measure your chest again. How much larger is it? Suppose you hold the tape measure or a stout cord tightly around your chest just where it reaches when you have breathed out. Then try to draw in a full breath again. Can you do it? You can draw in only a short breath, because the cord will not allow your chest to expand.

You can now see what happens when one wears clothing that is too tight around the chest and waist. The lungs lie in the chest behind the ribs, and they need plenty of room to swell when they are filled with air.

If the clothing is tight across the chest, the lungs have not room enough to expand and the body does not get enough air. If the clothing is usually worn tight it presses upon the ribs until they are pressed in, and the chest becomes smaller. If this is done in youth the lungs do not have a chance to grow to their full size, or to expand enough with each breath.

No one can be strong and healthy who has weak lungs. Put your hands on your hips, throw your shoulders back, close your mouth, and draw in air until you feel the lungs expand even down to the lower ends. If your clothing is as loose as it ought to be you can expand a good deal more than you usually do when breathing.

If you practice this deep breathing often in the open air, you can enlarge your lungs. If you practice it in the house be sure that the air of the room is pure.

With larger lungs you can take in more air at a time. What good will that do? You can run faster and farther without being tired, you can climb better, you can endure any kind of exercise longer, and you can sing or speak better. You will feel better. You will feel strong and active instead of weak and tired.

Tobacco smoke makes the air impure. Not only the one who smokes but every one else who is near is obliged to fill his lungs with this impure air.

The body is the house in which the soul lives, and nobody has a right to make even his own body impure. It is surely selfish, and thoughtless of others' rights, to fill the air which they must breathe with that which they dislike and which makes their bodies less pure.

Not long ago an elderly woman was riding in an open street car on the seat next to those reserved for smokers. The car was full so that she could not take another seat. A man behind her was smoking a cigar and the wind was blowing the smoke right into her face. The smoker did not care for that. He had paid his fare and was sitting in the smokers' seat, so he kept on puffing.

The woman grew pale and soon became too sick to endure it longer, and was about to get off the car when, fortunately, the man reached the end of his route and got off. Had he a right to make his neighbor sick that he might get a little pleasure for himself?

Has any one a right to do for pleasure what gives his neighbor pain or discomfort?

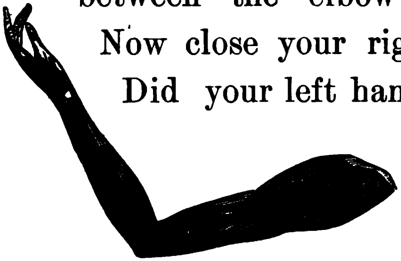
Some people drink wine, beer, or whisky, or other strong drink which contains alcohol without knowing how harmful it may be to the lungs.

The doct[redacted] us that people who use these drinl people to h and that when they get these diseases it is harder for them to get well.

LESSON XIX

HOW WE MOVE

REST your right arm on your desk. Place your left hand upon your right arm midway between the elbow and the wrist. Now close your right hand tightly. Did your left hand feel something in the right arm moving?



MUSCLES OF THE LEFT ARM.

Place your hand on the upper part of your arm just below the shoulder. Now raise your right hand. What do you feel with your left?

That which you felt moving was the muscles of your arm. Every step we take and every movement of any part of the body is made by the muscles.

The lean part of the meat which we eat is the muscle that helped some animal to move.

When you remember in how many ways one is able to move, you will think that it must take a good many muscles to make so many motions. It does take about five hundred. These muscles are of different sizes and shapes.

The muscles that move the legs and arms are long ones, while some of the muscles of the eye and ear are almost too small to be seen.

Look at a piece of lean meat that has been boiled a long time. You can separate it into little pieces that look like prisms. These are "muscle-bundles." Take a pin or needle and you can easily separate each bundle into fine threads or fibers. Now look at the delicate skin or membrane between the bundles.

The muscles are covered with a membrane

like that between the bundles, only it is much thicker. At the end of the muscle this thick muscle-skin is gathered with a strong cord. This is the tendon or sinew.

Can you feel the tendons in the back of the hand or on the front of the wrist? Close your hand tightly and feel the muscle that extends from the elbow to the wrist on the thumb side. You can feel the hard bundle, larger at the elbow end. Now draw the arm halfway up to the shoulder. At the bend of the elbow you can feel the cord or tendon by which the muscle fastens to the bone of the forearm.

Most of the muscles have to be told what to do every time a thing is to be done. That is, when we decide to move a hand or foot, a message is sent along a white, glistening, threadlike nerve telling the muscle what is to be done. But there are some muscles that do their work without our knowledge. They receive word, but we do not know what the messages are or when they are sent.

To these muscles is intrusted the moving of those parts of the body which keep us alive, that is, the breathing organs, the organs of digestion, and those of circulation. Such important things can be intrusted only to those who never forget.

A person is not likely to forget to feed himself, for he gets hungry, but he might forget to keep the heart beating or the lungs expanding, and then he would stop living. But no matter what we are doing, the heart goes on beating. As long as we stay where there is good air, and as long as we put plenty of good food into our stomachs, the work of digesting it, purifying it, and using it, goes on. And it goes on by the help of these muscles, of whose work we are not conscious.

LESSON XX

HOW THE MUSCLES DO THEIR WORK

DRAW your arm once more to the shoulder and feel the muscle of the upper arm. See how much thicker it becomes when the arm is drawn up. When the muscle gets thicker it must also get shorter, for no new material has come to it.

Now, as one end of the muscle is fastened to the bone of the forearm so that it cannot let go when the muscle becomes shorter, it must lift the bone to which it is joined. When it becomes longer again the bone goes back to its place.

Muscles are able to move other things because they can of themselves become shorter and then grow long again. How they do it no one knows. The horse's muscles are so strong that he can move very heavy loads.

When a muscle becomes shorter we say it contracts, and when it goes back to its usual length we say it relaxes.

Almost every motion we make requires more than one muscle, and some motions require many. The body would be very clumsy if the fleshy part of the muscle covered the joints too. But the muscles are attached to the tendons, and as you know, these are just strong cords, and do not take up much room. So there are no

muscles at the joints, but only ligaments and tendons.

When you have the leg of a chicken or a turkey you can find which cord moves each toe.

Do you know what gives the muscles their strength? How long would they be strong if you were to stop eating? If one stops eating for one day he will begin to feel less strong, and in a few days one gets so weak he can hardly walk.

The food which is digested in the stomach and intestines is taken up by the blood. It is carried all over the body, and the muscles take from the blood what they need for their food.

The best foods for building muscles are lean meat, eggs, milk, beans, peas, and the grains.

The best foods for giving strength to muscle are sugar, fat meat, butter, oil, and the starchy foods, such as rice, tapioca, sago, and cornstarch.

LESSON XXI

HOW TO MAKE THE MUSCLES STRONG

HAVE you ever noticed what big, strong legs children have in the country, where they take long walks? And have you not also seen what slim little legs many city children have?

Why has the child who takes long walks and climbs hills big legs, and the one who rides, and is even lifted upstairs by elevators, slim legs? Because muscles grow by using them.

If a boy or girl wants to be able to lift heavy weights, he must practice by lifting light ones many times. The boy who carries bundles, water, or coal, or who does hand and arm work every day, will have strong muscles in his arms, shoulders, and back.

The boy or girl who goes on errands or

runs races, who walks to school and takes long tramps, or who climbs hills, will have strong muscles in legs and hips.

Climbing trees is fine exercise for boys and girls. It gives them strong arms and shoulders.

If a person is too lazy to work or play his muscles will grow weak, and he will not be strong enough to have the good times which active children have.

If one is not fortunate enough to have work to do, or hills to climb, he must play or take exercise of a kind to strengthen the same muscles which are developed by work.

To get the best use of exercise one must begin with easy things, and as the muscles grow stronger, take harder exercise. Never begin with hard things. Learn to lift heavy weights by beginning with easy ones. Learn to run far by beginning with short distances, which you run often, and so on.

Girls need strong muscles just as much as boys do, and they can have them, too, by taking walks, by playing outdoor games, and by doing housework.

Good food and plenty of exercise are still not enough to make strong muscle. You will say at once that they need, besides these, pure air and sunshine. You all know how pale and weak plants look when they are kept away from the sunshine. People need sunshine just as much as plants do, and they become pale and weak if they are kept in the dark.

Fat is not muscle, and fat people are not the strongest people. There is really no strength in fat. Indeed, if one is very fat it shows that the body is not healthy. There may even be a disease which is changing the strong muscles into useless fat.

Beer and other alcoholic drinks sometimes make people fat, but they also finally make them weak.

Fat cannot contract and cannot lift a

single part
take care o
carry it aro

The hear
tracts to sq
over the bo
weaken thi
in it. Ther
well, and a
the drinker

Boys wh
instead of s
springing st
in a slouchi
weak. It i
their muscl

Soldiers
find that they are better able to do their work without alcoholic drinks.

Men in large business houses who are looking for boys to work choose those who do not use tobacco or cigarettes.

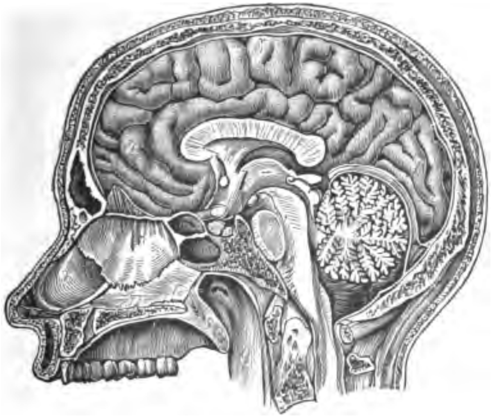
One school principal said that he had never known a boy who used tobacco to graduate from the grammar school or from the high school at the head of his class.

The fact is, that boys who use cigarettes or tobacco in any form seldom finish the high school course, and many of them drop out of school before they finish even the grammar school.

LESSON XXII

HOW THE BODY IS GOVERNED

Why does one's hand hold the pencil and move it along the page in graceful lines when one writes? It is because the muscles of the arm and hand are all the while receiving messages which direct them.

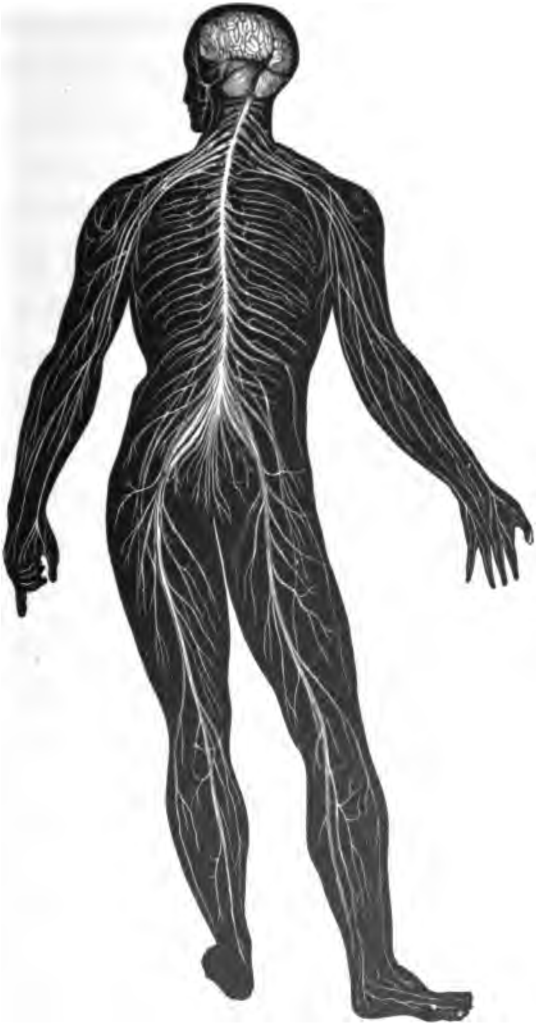


Section of the head showing how the brain would look if it were cut down through the middle.

These messages are all sent from the place where a person does his thinking, — a place where his wishes are felt and where he decides things. We do not have to think about the work of the heart muscles or of the stomach muscles to decide when they are to contract. But most of the muscles of the body, especially those of the arms, legs, back, face, and neck, must be told what to do. So we must think what to do next, and must send messages to the muscles to tell them when to contract and how much to contract.

The bony box called the skull is the house in which the ruler of the whole body lives. All the orders, which the body must obey, come from this ruler, whose name is *the brain.*

All our thoughts, all our wishes, all our actions, come from the brain. See how one part depends upon another. The bones help to give us motion, but not a



Nerves.

bone can move unless pulled by a muscle. Even the muscles depend upon the stomach and circulation for the food to make them strong enough to move.

Now we learn further that the muscles do not move unless they receive word through the nerves, and the nerves all carry messages from the brain. This helps us to understand better why such a tight, strong box was made to keep the brain from harm.

Do you remember what makes the muscles strong? The same thing makes the brain strong. The more we think the more we are able to think.

There are two parts to the brain which makes it look a little like the halves of a walnut meat.

The brain sends its messages by the nerves, and every nerve has to connect in some way with the brain. We might have good eyes, good ears, and good speaking organs, and yet not be able to see, or hear, or speak, if the nerves did not join these organs to the brain.

When a part of the brain is injured some other part of the body suffers too. If the part of the brain which rules the arm is injured, then the arm will no longer move when we wish it to do so.

If one touches a hot stove the nerves send word to the brain that it is hot, and the brain sends word back for the hand to draw away from the stove. All of the messages come to and from the brain in the little white nerves that are found in every part of the body just as the blood vessels are.

There are two kinds of nerves: those that go to the brain, and tell what is going on in every part of the body; and those that go from the brain, telling the muscles when and how to move.

Let us see how many messages it takes to catch a ball. One message tells the brain that the ball is coming, another that it must be caught. The eye receives a message to watch for it, and the hand is told to be ready to catch it. The eye tells the brain how far away it is and in which direction it is moving and how fast it is coming.

When it is near enough for one to reach it, the brain tells the muscles of the shoulder to raise the arm and to open the hand, and when the hand is upon the ball it receives a message to close the fingers upon it and the arm is told to bring it down. Really, there are many more movements and messages than these, for we have named only those easiest to understand.

The nerves that carry messages to the brain are nerves of sense. Those that carry messages away from the brain to the muscles are called nerves of motion.

LESSON XXIII

THE HELPERS OF THE BRAIN: THE SPINAL CORD AND NERVES

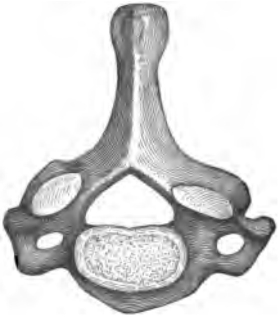
The next time you have chicken for dinner ask for the neck, and after you have taken off all the meat study the chain of bones. Notice how many there are, and how they are joined together with ligaments. Look at the end of the chain of bones, and find the hole in the middle. Let us see if we can find out what that hole is for.

If all the nerves had to go separately to the brain, there would be so many holes in the skull that the bony box would not be very strong after all.

These nerves do not enter separately. They are bound together and united into one great cord, called the *spinal cord.* This spinal cord lies in the hole or canal that runs through the middle of the chain of neck bones.

If you break the bones apart the spinal cord will pull out of one part, and you can see its shape and size.

Each bone has an opening. These openings fit one above the other, making a long tube, through which the spinal cord passes. Each part of it is protected by a bony wall.



The spinal cord must be as well protected as the brain. If any part of the cord is injured the brain cannot send messages past that part.

Every little way along this bony wall there are tiny holes, which allow nerves to pass out to go to the arms, legs, and other parts of the body.

Prick your finger or your body almost anywhere, and you will feel the pain, because you touch a nerve of feeling.

All of the nerves of motion are governed by our will, but sometimes they become diseased and will not do as we wish. Sometimes the head will shake continually, or the eyes will twitch, because the nerves are diseased and do not wait for orders before moving.

LESSON XXIV

THE CARE OF THE BRAIN

Do you remember how tired you were after a piece of hard work you once did, and how glad you were to stop to rest?

Even the heart has to rest a part of the time. It seems never to stop its work, but after each beat there is a pause, which gives the heart rest.

The lungs, too, seem to work all the while, when we sleep and when we wake, but they, too, rest after each breath.

The brain cannot stop working at regular times between thoughts, for as long as we are awake there is constant work for the brain to do. But it must have its rest, and this it gets when we sleep. Have you sometimes thought you had to go to bed too early?

Now that you know that sleep is the only way of resting so faithful a worker as the brain, you will surely be willing to go to bed early.

Children need more sleep than grown people do, and should be in bed before dark in the summer time, and soon after dark in the winter time, or their brains will not be rested by morning.

Dogs, which can live for twenty days without food, cannot live more than five days without sleep. It is said that man could not live more than ten days without sleep.

The brain may be somewhat rested by a change of work. If one has been studying hard, it rests the brain to do some bodily work like cutting grass, or pulling weeds, or playing some active game.

Success in life depends upon the brain. Memory, will power, the power to do new things or to do old things well, all lie in the brain. Only a brain that has the best care and best food can do the best work.

If in any way the brain should be even partly paralyzed, it could not govern all the movements of the body and the thoughts.

Perhaps you have seen a man who has been drinking an alcoholic drink trying to walk straight. He found it impossible, and staggered from side to side because his mind was partly paralyzed by the alcohol and could not govern his movements. (1)When he

affections of the brain and nervous
only in the transgressor himself, but in his children,
and these will transmit predisposition to any of
these diseases."

able to decide to do the right, even when he knows which he ought to do.

When a wrong thing is put before a person who is strong he says, "No"; but when his will is mad

o

s

Tobacco and cigarettes weaken the memory. One boy who had been a bright boy at

fter a

. He

e had

so bad

name.

clear

thinking, boys with strong wills to do right, would better keep their treasures, and never touch tobacco, or cider, wine, beer, and other drinks that contain alcohol. The use of tobacco and alcoholic drinks always makes them less successful in life than they could have been without them. One great doctor says that alcohol in the body paralyzes certain parts of the brain, destroys the judgment and fine thought. It keeps one from feeling when he is tired, and makes him think too highly of himself.

Would any one of you want to treat your brain so that it could not tell right from wrong, could not warn you to care for your body, and made you think more of yourself than your friends think of you?

Sometimes mothers and nurses give paregoric and soothing syrup to quiet the baby and make it sleep.

It makes the child sleep because there is opium in it, and the opium partly paralyzes the brain. But it harms the little brain, and takes away part of the child's future power.

To keep the brain clear one must have good food, good water to drink, pure air, plenty of exercise, and restful sleep.

LESSON XXV

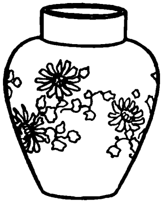
THE SPECIAL SENSES: THE EYE AND HOW WE SEE

If you ever go into a watch factory, a shoe factory, or a china factory, you will find that no one man or set of men makes a whole watch, or a whole shoe, or the whole of a dish.

In the watch factory there are certain men who make the springs, others who make the hands, and still others who make the many other parts of the watch.

In a shoe factory one set of men make the soles, another the uppers, and so on.

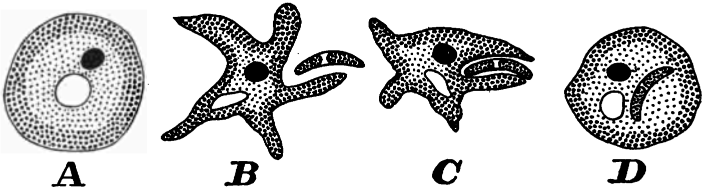
In the china factory one man molds the dishes into shape, others put handles upon them, still others decorate them, and so on, to the completed dish.



It is found that much better work can be done in this way. One man can learn to do one kind of work much better and faster than he can learn to do several kinds. This same thing is true in the human body.

Everybody knows about Robinson Crusoe, and how he had to do everything for himself. But you will find that his shoes were clumsy, his clothes ill-fitting, and his tools rude.

Among the lower animals one organ does the work for the mouth, the stomach, and the legs. But the work is all very simple; there is little that such animals can eat, and few places where they can go.



This shows a little animal smaller than the head of a pin. It lives in the water. It can change its shape from moment to moment. When it is asleep or resting it takes the shape of a sphere, *A*. When it is hungry it puts out little arms as in *B*. If it feels anything which it can eat its arms become a mouth to swallow it, *C*. Then it rests while the food digests, *D*.

By having special organs for special work in the human body, we are able to do the best work. Even the nerves do not all do the same work. But there are special nerves for special work. Those nerves that govern the senses of seeing, hearing, smelling, tasting, and feeling, we call nerves of special sense.

THE SENSE OF SIGHT

The eye, the organ of sight, is so precious that it is protected in every way possible. In the skull there are two deep, bony sockets in which the eyes rest. The eyelid shuts down whenever the eye is in danger, and the lashes keep the dust out. But the wonderful part is the eye itself. It is small, but it can take more beautiful pictures than the finest camera, and can take all the colors too.

The colored part of the eye, that makes it so beautiful, is the curtain of these windows of ours. The black spot in the middle of the colored curtain is the opening. It is called the pupil.

The muscles within the curtain make the opening large or small, to let in just the right amount of light.

When one goes into a very light room or into the bright sunlight, the curtain draws together around the pupil and makes it smaller. When one is in a dark room the curtain is drawn back to make the pupil larger and let in more light.

So much of what we know and so much of what we enjoy comes to us through the eye, that we count it one of our most valuable gifts.

By good care the eyes may be kept bright and useful for many years.

It does not hurt the eyes to use them. Indeed, they learn to see better by being used, if only they are well treated.

It is foolish to try to read or to do fine work by a dim light, or to read fine print, because that strains the eyes.

One should sit so that the light falls upon the book over the shoulder and not upon the face. Never read from a book upon which the sun is shining.

If your eyes smart when you read, or if you have headache after using your eyes, you ought to see a physician, who will tell you what is best to do.

Some people read when lying down. But this strains the eyes very much, as they are not in a position to see well.

One of the effects of alcohol is to make the senses duller, so persons who drink beer, wine, cider, whisky, and other strong drinks cannot see so clearly as they could without these drinks. For this reason most railroad companies do not allow the men who must watch for signals and obey them, to use any alcoholic drinks.

If they were to use them they might not see a signal quickly enough to obey it and a train might be wrecked. This might take many lives and waste much property.

Many such accidents have come through alcoholic drinks, and that is the reason why many railroad companies and steamship companies do not allow the men who run trains and steamers to use these drinks.

Men who use a good deal of tobacco are likely to have a disease of the eyes which dims the sight. There are many cases known where the use of tobacco caused great injury to the eyes.

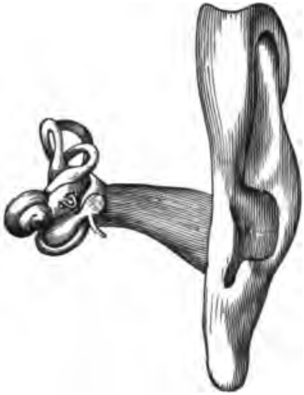
LESSON XXVI

THE EAR AND HOW WE HEAR

THINK of some of the pleasing sounds you have heard — of the beautiful music, of the song of birds, the wash of the waves by the seashore, the rustling of leaves among the trees, and the voices of friends.

Through the sense of hearing comes almost as much of what we learn and what we enjoy as comes to us through seeing.

The part of the ear with which we hear is not the part which one sees on the side of the head, but the part which lies within. This outside part of the ear is only to catch the sound and carry it to the inner part through a tube.



THE EAR.

At the end of the tube a skin is stretched across. This skin is the membrane of the ear drum. If this is injured, one cannot hear so well, and it is so delicate that a box on the ear or a loud shout close to the ear may break it.

From the inner part of the ear the nerves of hearing take the sound and carry it to the brain.

All the higher animals and some of the lower ones have this gift of hearing.

It seems to be nature's plan that the hearing should protect animals against surprise. If a deer is leading her little fawn through the forest, she steps very carefully in order not to make a noise for the wolves to hear. She keeps her sharp ears open for every sound that may be made by a stealthy enemy, so that she can flee with her little one at the first sound.

In these days we are warned of coming trains and vehicles by whistles, bells, or gongs, all making noises for us to hear.

Without hearing we should be much less safe from dangers and have much less pleasure than we now have. People sometimes lose their hearing through thoughtlessness in the care of the ear.

Never dig out the ear wax with a pin or stick. Use the end of the little finger covered with a handkerchief or a washcloth. If the wax hardens a drop of fluid cosmoline or of sweet oil will soften it, after which it may be removed with the finger and cloth.

LESSON XXVII

TASTE, SMELL, AND TOUCH

THE SENSE OF TASTE

THIS sense lies in the nerves of the tongue. We like the taste of some things and do not like the taste of other things. That, however, is not always a good reason for choosing certain things to eat and avoiding others, for we eat to be fed and not to be pleased.

The taste, too, can be educated, and what one does not like at first he can learn to like.

Very few people like oysters, naturally, but they become fond of them by eating some each time they are on the table.

If you do not like eggs, or milk, or cereals, remember that you can easily learn to like them and that they ought to be eaten.

Strong condiments, like pepper, mustard, catsup, and spices, dull the sense of taste. Tobacco injures the sense of taste. The tissues become so filled with the tobacco taste that other more delicate flavors are lost.

"I like the taste of Milk."

THE SENSE OF SMELL

A great deal that we speak of and think of as taste is really smell. For we can taste only sour, sweet, bitter, and salt. All the rest is flavor, and comes to us through the sense of smell.

By the sense of smell we are warned when food is bad or when air is impure. Through this sense we enjoy the sweet odors of fruit and flowers, the fragrance of newly cut grass, the balsam of the fir trees, and many other sweet smells that we like.

Animals that have to hunt their living by scenting it have this sense so educated that they can follow their prey simply by the scent.

The sense of smell is injured by bad colds and catarrh. When one carelessly takes cold, thinking that a cold is nothing, he runs the risk of injuring this valuable helper.

Tobacco and the habitual use of alcoholic drinks may also injure the sense of smell, and sometimes even destroy it entirely. The lining skin of the nos
thickened over the nerves
use of alcohol, and when
thickly covered they canno
well.

Dr. August Forel says:

“Professor Demme of Berne has c
pared the posterity of temperate famil
of drinking parents, and in the lat
shown a really fearful number of prer
from children's diseases, of dwarfing

This
It is fou
your bo
it in each place?

Can you feel it just as plainly in every place? Wherever there are more of the nerves of feeling the sense of touch is more acute. The ends of the fingers are so sensitive that when people have not the sense of sight they can learn to read by passing the finger over raised letters. Blind people "see" their friends by feeling their faces.

The proper use of this important sense depends upon the health of the nerves. Alcohol and tobacco put the nerves in an unhealthy condition and make one less sure of what he feels.

NOTE TO TEACHER. — The story of Helen Keller would make an appropriate introduction to the lessons on the special senses. Children are always much interested in this story, and it impresses, as almost nothing else could, the importance of the special senses.

LESSON XXVIII

THE COVERING OF THE BODY: THE SKIN

Does the sheep, the dog, or the bear wear clothing? You may at first say "No"; but after you have thought a little you may change your mind.

Indeed, they have such warm clothing that we are often glad to borrow it to add to our own.

Have you not seen bearskin coats, dogskin gloves, and many, many things made from sheep's wool?

The skin, whether it is covered with thick hair or not, is the body clothing and fits over every curve of the body. At the joints it is full enough to allow the bones to move. Look at the folds over the finger joints and watch them when you bend the joints.

The clothing which we put on wears out and has to be cast aside. The skin also

wears out and we cast it off, but not all at once, as we do our other garments. Snakes and insects, however, put their skins off all at once. You may have seen them lying about after they were cast aside. Birds molt, and so change their clothes, while horses and cows, cats and dogs, shed their hair, and so get rid of their old clothes.

The skin has two layers. All the blood vessels which feed it and all the nerves of feeling come into the lower layer. This makes it very sensitive, and if there were not an outer layer we should be in pain all the time from something touching the nerves or hurting the blood vessels.

The outer layer has no feeling, which is very fortunate.

As the skin rubs against the clothing or against things which we handle it wears off in tiny scales. It is kept from becoming thinner by being fed from below. If one's hands are very tender and if one uses them for hard work, the skin wears out faster than it is repaired, and wears down to the sensitive part of the skin.

The skin has a great deal of work to do.

It contains all the nerves of feeling and gives the brain all the ideas it has of heat or cold, roughness or smoothness, stickiness, etc.

It protects us from much pain and injury, but that does not begin to be all of its work.

The roots of the hair are all in the skin. The oil glands, which keep the skin smooth, are there, and the glands which collect the sweat.

Perhaps the word gland is a new one. It simply means an organ for collecting these different liquids.

The sweat which the glands collect is not pure, clean water. It contains much impurity which it would harm the body to retain. The sweating which carries away this impure matter goes on all the time, night and day, winter and summer.

When it is very warm much more sweat or perspiration is formed. Then it comes in tiny drops on the outside of the skin, where it helps to cool the body.

The oil which the skin secretes keeps it soft. Sometimes the hands or face chap, and then one puts on cream or oil of some kind. The chapping showed that there was not enough of the natural oil.

The oil feeds the hair, too, and helps to keep it smooth. Thorough brushing of the hair makes the glands more active, and the hair look glossy and smooth.

THE CARE OF THE SKIN

One should avoid cooling off suddenly when he is perspiring, as it closes the pores of the skin and keeps the perspiration in the body. This often gives one fever, and if not so severe as that, it is almost sure to give one a cold.

After exercising one must be careful not to sit in a draught or a cold room, or to drink very cold water. It is better to put on more clothing than to try to cool off quickly.

It is sometimes [redacted]hol keeps a
blood rush
e skin, and
arm. But
to the skin
and leaves
the person colder than before.

In cold countries those who drink alcohol are more easily frozen than those who do not, and in hot countries those who drink alcohol are more likely to suffer from sunstroke than those who do not.

LESSON XXIX

BATHING

PUT a pan of salt water in the sun and see what happens. If you were to step into salt water your shoes would look white with a powder when they dried, for the water evaporates and leaves the salt on the shoes.

That is the way with the impure part of the sweat. It does not go off into the air; it remains on the body after the water part has evaporated.

To get rid of it one must wash it off with soap and water, at least once a week. If left upon the body it fills up the little pores and keeps the sweat from coming out, and, besides, it has a very bad odor. The bath not only takes off these impurities, but it also takes off the old, worn-out skin that has done its work and is now only in the way.

If one washes off the body with a sponge and cool water every morning he is less likely to take cold and is more healthy in other ways.

A good thorough rubbing after the bath

does as much good as the bath itself, for it makes the blood flow through the skin. Frequent bathing with good rubbing exercises the skin and makes it better able to do its work.

Clothing catches the worn-out skin and the waste from the sweat. When it is taken off at night it should be hung up to air before being put on again in the morning. This is especially true of the garments worn next to the body. Night clothes, too, should be hung up to air before they are put away.

However good a thing may be, it must be taken at the right time to do the most good, or to keep it from doing even harm instead of good. If one were to take a cold bath when heated from work or play it might make him sick. A bath should not be taken just after eating, but is best taken just after rising or just before going to bed, or between meals.

When bathing at the sea shore or lake shore one should not stay long in the water or he will become chilled, and this sometimes makes one sick.

A clear skin is beautiful to look at. A healthy skin is usually a clear one. Alcohol makes the nose red and makes blotches on the face. Cigarettes and tobacco in other forms give boys a sallow skin, that shows how the health is being ruined by their use.

LESSON XXX

WHAT SHALL WE WEAR?

Besides the clothing which nature gave us, our bodies have come to need something more.

In warm countries or in warm weather clothing keeps the sun from burning the flesh, and in cold countries or in cold weather it helps to keep the heat from leaving the body.

Every one must have clothes, and as they must be fitted to our bodies and suited to our needs, they must be given some thought. But when children or grown people are always thinking of their clothes and wondering how they look there is something wrong.

What kind of clothes shall we wear? If

they are tight about the waist, the weight of them hangs upon the delicate organs in the abdomen. The better way is to hang the clothes from the shoulders, where there are strong bones to bear the weight.

We have already spoken of having the clothing loose enough over the lungs to allow one to take deep breaths, and of wearing shoes that are not too tight.

The clothing should protect the legs separately. In snowy weather children should wear leggings that may be taken off at school, leaving the stockings dry.

Rubbers should be worn to keep the feet dry, but they should be taken off as soon as one enters the house, for they keep the perspiration from passing off.

The best clothes for children to wear to school are plain, strong ones, that are not easily soiled or torn. Of course they should be loose enough to allow any movement which the body needs to make.

It is not necessary that clothing should cost much in order to make it useful or pretty. The little girl who wears to school plain clothes which give her free motion can forget herself. Then her mind is free to think of her work and her play. Is she not much happier, healthier, and better able to learn than the one who is overdressed so that she keeps her clothes always in mind?

The body is more than the clothes, and children should think only enough about their clothes to keep them clean and whole. No one is well dressed, no matter how costly the clothing, if he is not able to make all the motions which his life requires, and make them gracefully and freely.

LESSON XXXI

HOW SHALL WE SPEND OUR MONEY?

WHAT has that to do with physiology? Perhaps after we have finished this chapter you will be able to tell.

All money that is spent for that which does no good is wasted.

Nearly all children have pennies to spend, and it is important that these pennies should not be wasted.

A penny seems a little thing, and yet it is simply by having enough pennies that we buy all the things that give us health, comfort, and pleasure.

If pennies are spent for candy or cake to eat between meals, it not only wastes the money but harms the body. For at that time the body has been given all the food it needs, and to give it more is wasteful. To give it at other than usual times upsets the stomach and keeps it from getting the good from the next meal.

Suppose the pennies are spent for some really good thing which one does not need, but which he buys just because he has the money. Is it not wasted just the same?

It is better to save the pennies until a real want can be supplied, than to go and hunt up a want in order to spend the pennies.

Some boys spend their money for cigarettes. Does that pay?

Cigarettes make the air impure and the throat dry. They irritate the lungs, and make the blood poorer, and the brain less steady. They make the nerves less reliable, and harm the sight, hearing, and taste.

Does it pay to spend money for anything which does so much harm and not one bit of good?

When a merchant is looking for a boy does he want one who smokes cigarettes?

One man, who hires many boys, said that when a boy came to him for work, he looked first for the cigarette stain on his fingers. If he found it he looked further for a boy.

When boys are training for athletics they are not allowed to smoke. Do you think they would be kept from it if it made them stronger, or quicker, or able to stand more?

Five or ten cents a week spent in cigarettes will ruin a boy's body and mind. Five or ten cents a week put in the savings bank will make $2.60 or $5.20 a year; $5.20 a year will make $52.00 in ten years without interest, and with interest at 4 per cent it will amount to $72.80.

Girls who spend every penny as fast as they can for something to eat, will learn to like to eat better than to do some nobler things, and to think more of their stomachs than of their minds.

Baldwin's School Readers

By JAMES BALDWIN

Editor of "Harper's Readers," Author of "Old Greek Stories," "Old Stories of the East," etc.

In method and in subject matter, as well as in artistic and mechanical execution, these new readers establish an ideal standard, equally well adapted for city and country schools. They possess many original and meritorious features which are in accord with the most approved methods of instruction, and which will commend them to the best teachers and the best schools. The illustrations are an important feature of the books, and are the work of the best artists. They are not merely pictures inserted for the purpose of ornament, but are intended to assist in making the reading exercises both interesting and instructive.

BALDWIN'S SCHOOL READERS—EIGHT BOOK EDITION

First Year,	128 pp.	25 cents	Fifth Year,	208 pp.	40 cents
Second Year,	160 pp.	35 cents	Sixth Year,	240 pp.	45 cents
Third Year,	208 pp.	40 cents	Seventh Year,	240 pp.	45 cents
Fourth Year,	208 pp.	40 cents	Eighth Year,	240 pp.	45 cents

For the convenience of ungraded schools, and for all who may prefer them in such combined form, an edition corresponding to the ordinary five book series of school readers will be furnished as follows:

BALDWIN'S SCHOOL READERS—FIVE BOOK EDITION

First Year,	128 pages	25 cents
Second Year,	160 pages	35 cents
Third Year,	208 pages	40 cents
Combined Fourth and Fifth Years.	416 pages	60 cents
Combined Sixth and Seventh Years.	480 pages	65 cents

Copies of any of the above books will be sent, prepaid, on receipt of the price.

American Book Company

New York • Cincinnati • Chicago

Barnes's Natural Slant Penmanship

The system of writing represented in these new copy books combines all the advantages of the vertical with the speed and beauty of regular slant writing.

It is well known that an extreme slant tends to angularity, while vertical writing is usually slow and tends to an unsightly back-hand or irregular slant. If left to themselves, without specific directions, children naturally fall into a certain slant in writing,—intermediate between vertical and slant writing. This natural slant has been adopted as the standard in these copy books.

FORMS OF LETTERS.—Natural Slant copies are designed to be *written, not printed.* They have the simplicity and the full, round, open style of the best vertical forms, but avoid some of the extremes and eccentricities that have characterized that style of writing. In every instance the form of capital employed has been selected, first, because of its legibility; second, because of its ease of execution; and third, because of its graceful form. Every copy is *sensible and significant*, and as nearly as possible the subject matter relates to topics which interest the pupils of the grades for which the respective books are intended. In other words, the writing exercises are made to correlate with the other branches of study pursued in the schools.

THE SERIES includes Books A, B, C, and D, small size, illustrated, to be written with pen or pencil, and Books 1 to 8, full size, the first two books illustrated. A set of penmanship WALL CHARTS in four sheets is published to accompany this series of copy books.

BOOKS A, B, C, and D, per dozen	$0.60
BOOKS 1 to 8, per dozen	.75
CHARTS, per set of four sheets	1.50

Copies sent to any address, prepaid, on receipt of price.

American Book Company

New York ◆ Cincinnati ◆ Chicago

The Natural Geographies

NATURAL ELEMENTARY GEOGRAPHY
Linen Binding, Quarto, 144 pages . . . Price 60 cents

NATURAL ADVANCED GEOGRAPHY
Linen Binding, Large Quarto, 160 pages . . . Price $1.25

By JACQUES W. REDWAY, F.R.G.S., and RUSSELL HINMAN, Author of the Eclectic Physical Geography.

The publication of **The Natural Geographies** marks a new era in the study and teaching of geography. Some of the distinctive features which characterize this new series are:

1. A Natural Plan of Development, based on physical geography and leading in a natural manner to the study of historical, industrial, and commercial geography.
2. Clear and distinct political maps showing correctly the comparative size of different countries, and physical maps showing relief by contour lines and different colors, as in the best government maps.
3. Inductive and comparative treatment of subjects according to the most approved pedagogical principles.
4. Frequent exercises and reviews leading to the correlation and comparison of the parts of the subject already studied.
5. Topical outlines for the language work required by the Courses of Study of the best schools.
6. Supplementary Exercises including laboratory work and references for collateral reading.
7. Numerous original and appropriate pictures and graphic diagrams to illustrate the text.
8. Clear explanations of each necessary term where it first occurs, and omission of formal definitions at the beginning of the book.
9. Strict accordance, in method and treatment, with the recommendations of the Committee of Fifteen.

Illustrated Circulars describing the plan and method of The Natural Geographies will be sent free to any address on application.

Copies of The Natural Geographies will be sent, prepaid, to any address on receipt of the price by the Publishers:

American Book Company

New York ◆ Cincinnati ◆ Chicago

BARNES'S NEW HISTORIES OF THE UNITED STATES

BARNES'S ELEMENTARY HISTORY OF THE UNITED STATES Told in Biographies by JAMES BALDWIN. Cloth, 12mo, 360 pages. With maps and illustrations	**$0.60**
BARNES'S SCHOOL HISTORY OF THE UNITED STATES Thoroughly revised and brought down to date. Half leather, 8vo, 432 pages. With maps and illustrations .	**1.00**

THESE standard and popular histories have been thoroughly modernized, both as to appearance and contents. They offer present-day views of history and methods of teaching. The larger book has been revised in every particular, and the smaller one entirely rewritten by that charming and well-known writer for children, DR. JAMES BALDWIN.

The **Elementary History** tells the story of the country in a series of biographies of important men as recommended by the Committee of Fifteen. The incidents narrated show the manners of the time, and the stories are all intensely interesting. The numerous illustrations form an important aid to the understanding of the text.

In the **School History**, while the fascinating literary style and the remarkably successful distinctive features of the original volume have been retained, greater prominence has been given to industrial and social development. References for collateral reading have been inserted at frequent intervals, and many new maps and pictures introduced.

Write for illustrated descriptive circular.

AMERICAN BOOK COMPANY, Publishers
NEW YORK · CINCINNATI · CHICAGO
(118)

Winslow's Natural Arithmetic

BOOK I.	256 pages	Price, 30 cents
BOOK II.	271 pages	Price, 40 cents
BOOK III.	303 pages	Price, 50 cents

By ISAAC O. WINSLOW, M.A.
Principal of Thayer Street Grammar School, Providence, R. I.

This series adopts the conservative middle ground between the plan of a single book or two books and that of a separate book for each school year. Although these books are in several important respects distinctly original, they contain nothing that is impractical or experimental. The general plan is based on the spiral method of developing the different topics, and has been worked out by actual practice in the school-room. In addition to the use of this method the work is made easy and practical, the study is given variety and interest, logical mathematical thought on the part of the pupil is developed, and the idea of magnitude receives the special attention it deserves.

Book I begins with work for the third school year, and aims to establish the habit of true mathematical perception and to lead the child to avoid the practice of reckoning merely by counting. While the work is varied and instructive, sufficient drill exercises are given from time to time to produce thoroughness and accuracy.

In **Book II** common fractions, decimal fractions, and percentage are gradually developed in their simpler aspects. The method pursued in connection with these subjects is to first lead the child to grasp the conceptions involved, a formal statement of the propositions being withheld until later.

In **Book III** the treatment of the special branches of the subject is completed and a summary is given of all the processes involved in the development of each part. In order to correlate arithmetic and algebra, problems are frequently introduced which admit of either arithmetical or algebraic solution.

Copies of Winslow's Arithmetics will be sent, postpaid, to any address on receipt of the price.

American Book Company

New York ◆ Cincinnati ◆ Chicago

(52)

Maxwell's English Series

WILLIAM H. MAXWELL, M.A., Ph.D.
Superintendent of Schools, City of New York.

First Book in English	**40 cents**
Introductory Lessons in English Grammar	**40 cents**
Advanced Lessons in English Grammar	**60 cents**
Maxwell & Johnston's School Composition	**50 cents**
Maxwell & Smith's Writing in English	**75 cents**

The **First Book in English** combines lessons, practice, and instruction in the elementary principles in the English language, in such a rational and practical way as to make a text-book for beginners in language study, which avoids both the platitudes of many "language lessons" and the difficulties of "technical" grammar.

The **Introductory Lessons** presents as much of the science of grammar with its applications as children can understand and appreciate before taking up advanced work. The book contains in a compact form a well-graded and perspicuous treatment of all the subjects usually taught in English Grammar.

The **Advanced Lessons** embraces all the *theory* and all the *practice* that are necessary during the last two years of a grammar-school or throughout a high school course.

The **School Composition** is inductive in plan, and correspondingly helpful. The topics suggested for compositions are those which will appeal to the children, who are shown how to present these subjects by the analysis and imitation of models.

Writing in English is intended for advanced grades. It takes up first entire compositions, next paragraphs, then sentence construction, and finally words. A special feature is the large number and practical character of the exercises.

AMERICAN BOOK COMPANY, PUBLISHERS

(78)

ies

ents
ents
nts

nts
its
—
nd
e,
or
s